

ABSTRACT OF THE DISCLOSURE

The present invention generally provides a process and an apparatus for depositing low dielectric constant films and low dielectric constant capping layers on a substrate. The low dielectric constant films are mesoporous oxide films formed by depositing and curing a sol gel precursor containing a surfactant to form a oxide film having interconnecting pores of uniform diameter, and then annealing the film in an inert gas atmosphere or exposing the film to an oxidizing atmosphere containing a reactive oxygen species to form a mesoporous oxide film. A preferred mesoporous oxide film is produced by spin-on deposition of a sol gel precursor containing TEOS, water, and a surfactant in an alcohol based solvent on a substrate, curing the sol gel precursor to form a cubic phase film, and then exposing the film to an oxidizing atmosphere. The apparatus of the invention provides a cassette to cassette processing system which processes multiple substrates and combines the advantages of an atmosphere processing module for depositing films, such as dielectric films, with an in-situ vacuum capping module for high quality substrate processing, high substrate throughput and reduced contamination of the process.